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Deepika
Department of Plantation
Crops, Spices, Medicinal and
Aromatic Plants,
Uttarakhand, India

Goswami G
Department of NRM, VCSG
Uttarakhand University of
Horticulture and Forestry,
Bharsar, Uttarakhand, India

Effect of integrated nutrient management on yield attributes and yield of fenugreek (*Trigonella foenum graecum* L.)

Deepika and Goswami G

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Abstract

The present investigation entitled “Effect of Integrated Nutrient Management on Yield attributes and Yield of Fenugreek (*Trigonella foenum graecum* L.)” was carried out at the Medicinal and Aromatic Plant Block, Department of Plantation crop, Spices, Medicinal and Aromatic Crop, College of Horticulture, VCSG Uttarakhand University of Horticulture and Forestry, Bharsar Pauri Garhwal during the month of October 2019 to May 2020. The experiment was laid out in the Randomized Complete Block Design (RCBD) with three replications. The experimental study consisted of 11 treatments having integrated application of different doses of organic manure, inorganic fertilizer and biofertilizer i.e., (N, P, K, FYM, compost, neem cake and PSB). The treatments were replicated thrice in a plot having dimension of 1.5 m × 1m and a spacing of 30 cm × 10 cm was followed. The application of these nutrients in integrated form were applied at sowing time and the data obtained for various yield characters were statistically analyzed to find out the significance of these integrated nutrients. In present investigation, it was observed that the application of organic manure, inorganic fertilizer and biofertilizer has significant effect on the yield attributes of the crop. The results revealed that the application of 75% RDF + 25% FYM + PSB in treatment T₉ recorded maximum leaves yield per plot 70.50 (g/m²), seed yield per plot 275.50 (g/m²), economic yield (20.16 q/ha). The treatment T₁₁, T₁₀ and T₂ were found at par with the treatment T₉ in yield parameter as well as in economical yield. So, it is clearly concluded that there is good scope of increasing crop yield or seed yield with the use of integrated nutrient management as it is important for sustaining production and improving the fertility of soil.

Keywords: Pusa early bunching, Medicinal plants, integrated nutrient management (INM) nitrogen phosphorus potassium (NPK), farmyard manure (FYM), phosphorus solubilizing bacteria (PSB)

Introduction

Fenugreek (*Trigonella foenum graecum* L.), is an annual herb legume and one of the most important medicinal and aromatic crop that has been grown for centuries across the Indian subcontinent. It is a multipurpose crop whose every part is consumed as green leafy vegetable, fodder and condiment (Khiriya and Singh, 2003) ^[4] and is cultivated worldwide under semiarid agro-climatic conditions having potential to fix atmospheric nitrogen and tolerant to mild salinity (Habib *et al.*, 1971) ^[5]. It is used as a vegetable, spice and a medicinal plant. Since antioxidant properties are linked to health benefits of natural products, such properties were studied in germinated fenugreek seeds which are considered to be more beneficial than dried seeds (Dixit *et al.*, 2005) ^[3]. These plants are used for blood lipids and sugar decreasing in diabetic and non-diabetic peoples and have antioxidant and antibacterial activity (Pareek and Gupta, 1981) ^[10]. Chemical fertilizers have deleterious effect on soil fertility leading to unsustainable yields; while integration of chemical fertilizers with organic manures and bio-fertilizers would be able to maintain soil fertility and sustain crop productivity (Jeyabal *et al.*, 2000) ^[7]. Practice of INM is the better option for the improvement of physical, chemical and biological properties of soil (Das *et al.*, 2014) ^[2].

Materials and Methods

The investigation on Effect of Integrated Nutrient Management on Yield attributes and yield of Fenugreek (*Trigonella foenum graecum* L.) was conducted for a period of 5 to 6 months. The experiment was laid out in randomized block design during October 2019 to may 2020

Corresponding Author:
Deepika
Department of Plantation
Crops, Spices, Medicinal and
Aromatic Plants,
Uttarakhand, India

at the Medicinal and Aromatic Plant Block, Department of Plantation crop, Spices, Medicinal and Aromatic Crop, College of Horticulture, VCSG Uttarakhand University of Horticulture and Forestry, Bharsar Pauri Garhwal with the three replication and eleven treatment viz., T₁ (control), T₂ (100% RDF), T₃ (75% RDF + 25% FYM), T₄ (75% RDF + 25% compost), T₅ (75% RDF + 25% neem cake), T₆ (50% RDF + 50% FYM), T₇ (50% RDF + 50% compost), T₈ (50% RDF + 50% neem cake), T₉ (75% RDF + 25% FYM + PSB), T₁₀ (75% RDF + compost + PSB), T₁₁ (75% RDF + 25% neem cake + PSB). The various yield attributes were taken as number of leaves per plant was taken from selected plant and weight in gram whereas the leaf yield per plot is taken after the harvest of fenugreek from each plot and weigh in gram. The cleaned and dried seeds of the five labeled plants of fenugreek were weighed and expressed in gram for seed yield per plant. Whereas clean grains after threshing and winnowing obtained from individual plot were weighed in seed yield per plot.

Results and Discussion

The performance of fenugreek was better under recommended doses of fertilizer (NPK), with FYM and biofertilizer. Application of 75% RDF + 25% FYM + PSB recorded maximum leaf yield per plot, seed yield per plot and economic yield was significantly superior over rest of the treatments. Significantly the maximum leaf yield 9.39

kg/ha the increase in production of the crop due to integrated nutrient management was also reported by Tolanur and Badanur (2003) [12] and Tolanur (2009) [11]. Similar result collaborated with the finding of Nambiar and Abrol (1989) [9].

The highest seed yield 275.50 kg/ha were recorded with the application of RDF + FYM + PSB. Increase in yield attributes due to increasing levels of P will have direct and positive effect on seed, straw, economical and biological yields of fenugreek. These results confirm findings of Bhunia *et al.* (2006) [1] and also these results corroborated with the findings of Jat and Shekhawat (2001) [6] and Ali *et al.* (2009).

The maximum economic yield 20.16 q/ha was obtained from treatment T₉ with the application 75% RDF + 25% FYM + PSB. Synergistic effect of PSB might increase the growth and yield attributes which ultimately increased seed, straw and biological yields of fenugreek due to higher nitrogenase activity and available P status of soil Meena *et al.* (2001) [8]. To increase the productivity of improved varieties of fenugreek by adoption of recommended package of practices for cultivation is very high step today. Among various cultural practices, optimum use of integrated nutrient management is prerequisites to achieve a uniform crop stand which ultimately reflects on the seed yield and quality of crop.

Table 1: Effect of integrated nutrient management at different time interval on leaf yield per plot, seed yield per plot and economic yield at harvest

Treatment Codes	Treatment Details	Leaf yield (kg/ha)	Seed yield (kg/ha)	Economic yield (q/ha)
T ₁	CONTROL	4.60*±0.23	604.44±10.60	6.04±0.10
T ₂	100%RDF	8.35*±0.09	1,744.21*±26.95	16.41*±0.15
T ₃	75%RDF+25% FYM	8.08*±0.05	1,390.00*±72.34	13.90*±0.72
T ₄	75%RDF+25%COMPOST	7.55*±0.05	1,192.22*±34.01	11.92*±0.34
T ₅	75%RDF+25%NEEMCAKE	7.77*±0.08	1,298.88*±18.48	12.98*±0.18
T ₆	50%RDF+ 50%FYM	6.62*±0.02	1,091.10*±15.55	10.91*±0.15
T ₇	50%RDF+ 50%COMPOST	5.19*±0.38	925.55*±26.26	9.25*±0.26
T ₈	50%RDF+ 50%NEEMCAKE	5.46*±0.80	1,038.88*±60.92	10.39*±0.60
T ₉	75%RDF+25%FYM+PSB	9.39*±0.13	1,836.66*±106.68	20.16*±1.10
T ₁₀	75%RDF+25%COMPOST+PSB	8.79*±1.32	1,778.88*±2.91	17.11*±0.04
T ₁₁	75%RDF+25%NEEM CAKE+PSB	9.04*±0.08	1,803.33*±87.95	17.26*±0.42
S.E(d)		0.12	0.69	77.79
C D _(0.05)		0.26	1.46	163.41

*Significance at 5% level of significance compared with control (T₁)

Conclusions

Based on the present experimental result, it revealed that the integrated nutrient management proved to be effective in the yield attributes and yield of fenugreek (*Trigonella foenum graecum* L.). It is concluded among different treatment used in which treatment T₉ (75% RDF + 25% FYM + PSB) shows the best result in overall plant yield parameter and was the most effective integration of different nutrient combination. It also found best suitable to get higher seed yield and profits at Bharsar climate condition.

In view of better quality, sustainable yield, returns and to maintain the soil fertility status fenugreek grown by adopting integrated nutrient management practices was quite beneficial.

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